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DEPARTMENT OF COMMERCE

UNITED STATES BUREAU OF MINES
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TEN YEARS OF FATAL ACCIDENTS AND TWO YEARS OF ACCIDENT COSTS IN INDIANA COAL MINING

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DEPARTMENT OF COMMERCE - BUREAU OF MINES

TEN YEARS OF FATAL ACCIDENTS AND TWO YEARS OF ACCIDENT COSTS IN INDIANA COAL MINING[1]

By C. A. Herbert[2]

The Workman's Compensation Law of Indiana, enacted in 1915, amended in 1917, 1919, 1923, and 1927, and in 1929 named the Indiana Workmen's Compensation Act of 1929, provides for a weekly compensation for disability due to accidents of 55 per cent of the average weekly wage of the employee, to start on the eighth day of disability. Compensation is computed from a maximum and minimum weekly wage of $30 and $16, respectively. Thus, the maximum weekly compensation is $16.50 and the minimum $8.80; the total compensation paid is not to exceed $5,000.

In addition to the compensation the employer is required to pay all medical, surgical, hospital, and nurse fees for a period of 30 days and may be required to pay such fees for an additional 30 days at the direction of the Industrial Board of Indiana. In the case of fatalities the employer must contribute $100 toward funeral expenses.

The law also stipulates that "the employer shall keep a record of all injuries, fatal or otherwise, received by his employees in the course of their employment," also that the employer shall report within one week of their occurrence all accidents that cause either the death of the employee or the loss of more than one day's work. However, no standard form is furnished or required by the industrial board on which the employer shall keep a record of accidents, neither is he required to report the time of return to work of the injured employee unless the period of disability exceeds seven days and the accident thus becomes compensable. Hence, no record is kept of noncompensable accidents other than the first report sent to the industrial board by the employer.

IMPORTANCE OF KEEPING RECORDS

If the employer were required to keep a complete and concise record of all accidents, in duplicate, on a special form either furnished or required by the board, giving all of the essential data in regard to the accidents, and if he were required to submit a copy of this record to the board at the end of the fiscal year, the data thus assembled would not only be of material assistance to the board, particularly in making up its annual report, but would also furnish information of much value in the study of accident causes and what may be done to remove them.

Those industries that have made marked progress in reducing accidents keep such records, as it is only through a full knowledge of how accidents occur that intelligent steps can be taken to prevent their recurrence. Unfortunately, the mining industry as a whole in Indiana has not kept pace with many other industries in reducing accidents, and it is urged as an aid to improvement that a thorough and complete record of mining accidents be kept.

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[1] - The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6672."

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Accidents to men who have not returned to work because of the injury, or accidents for which claims have not been settled at the close of the fiscal year, should be carried forward on the next year's report.

Following is a suggested form of report (fig. 1) that might be used in connection with accidents in mining, and doubtless a similar general form could be made up applicable to other industries. These reports should be filed separately as to industry and alphabetically as to company. The sheet could be 14 by 20 inches and the columns headed "Cause of injury" and "Nature of injury" each about 4 inches wide.

Table 1 lists the fatal accidents by causes for the 10 fiscal years ending September 30, 1922 to 1931.

Table 1.- Fatal accidents by causes in Indiana coal mines for the fiscal years ending September 30, 1922 - 1931 inclusive

Cause	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	Total	Per cent of total
Underground:												
Falls of roof	13	25	30	22	22	16	19	19	16	13	195	35.1
Falls of coal	2	2	2	1	4	1	-	1	2	3	18	3.2
Mine cars	7	12	2	3	11	4	3	3	4	3	52	9.4
Locomotives	-	10	7	4	1	2	2	1	-	3	30	5.4
Electricity	1	1	1	2	1	1	2	4	-	5	18	3.2
Gas and dust explosions	6	9	5	65	6	43	-	2	1	29	166	29.9
Mine fires	-	-	4	-	-	-	1	-	-	-	5	.9
Explosives	2	5	-	-	1	-	1	2	-	1	12	2.2
Mining machines	-	-	-	-	-	1	-	-	-	-	1	.2
Loading machines	-	-	-	-	-	-	-	1	-	-	1	.2
Suffocation (other than in fires or explosions)	1	1	-	-	-	-	-	1	-	1	4	.7
Animals	3	-	-	-	-	1	-	-	-	-	4	.7
Falling objects	-	-	-	1	-	-	1	1	-	1	4	.7
Miscellaneous	3	-	-	-	-	-	1	2	-	1	7	1.2
Shaft:												
Falling down shaft	1	1	1	-	-	-	2	1	-	2	8	1.5
Cage	-	5	-	2	1	2	-	4	-	1	15	2.7
Material falling down shaft	-	-	1	-	-	-	-	-	-	-	1	.2
Miscellaneous	-	-	1	-	-	-	-	-	-	1	2	.4
Surface:												
Railroad cars	-	1	-	1	1	1	-	-	-	1	5	.9
Machinery	-	-	1	-	-	2	-	-	-	-	3	.5
Falling material	-	1	-	-	-	-	-	-	-	-	1	.2
Falling persons	-	2	-	-	-	-	-	-	-	-	2	.4
Miscellaneous	-	1	-	-	-	-	-	-	-	-	1	.2
Total	39	76	55	101	48	74	32	42	23	65	555	100.0
Coal produced, million tons	14.95	25.36	19.21	17.69	18.50	16.17	11.25	12.07	10.89	9.06	-	-
Fatalities per million tons mined	2.61	3.00	2.86	5.71	2.60	4.6	2.84	3.48	2.11	7.16	3.70	-
Average for United States 1911 to 1928	3.77											
Fatalities per 1000 employed	1.35	2.43	2.01	5.09	2.68	3.39	2.11	3.48	2.14	6.53	3.12	-
Average for United States 1911 to 1928	3.08											

COAL-MINE ACCIDENT REPORT FOR FISCAL YEAR OCTOBER 1, 19___ TO SEPTEMBER 30, 19___

Name **Address**

Coal company or proprietor -
Mine -
Insurance carrier -

Date of injury	Name of person injured	Address of person injured	Occupation	Age	Number of dependents	Place in mine or on surface where injury occurred	Cause of injury	Nature of injury If fatal, give date of death	Degree of injury*	Date of return to work	Days lost	Compensation paid	Medical and hospital or funeral expenses	Total expenses	Name of foreman in charge of injured
										Total					

* Indicate by symbols as follows:
T. Temporary disability
P.P. Permanent partial disability
T.D. Total disability
F. Fatal

Figure 1.- Suggested form of mine-accident report

Original from THE OHIO STATE UNIVERSITY

The foregoing table includes 31 fatalities in small mines employing less than 10 men, over which the inspection department has no jurisdiction and which are not shown in the annual reports of the Indiana Department of Mines and Mining; for this reason the totals shown for the various years do not always correspond to the totals given in those annual reports. The foregoing data were obtained from the files of the department through the courtesy of Albert C. Dally, chief mine inspector.

Of the 166 men killed by gas and dust explosions, 116 were killed in three major disasters: Namely, 51 in the City mine, February 20, 1925; 37 in the Francisco mine, December 9, 1926; and 28 in the Little Betty mine, January 28, 1931. These explosions were attributed to ignition of gas by open lights. All three could doubtless have been prevented had there been better supervision and better ventilation, or had permissible lights and permissible equipment been in use; without doubt they could have been limited in extent, with a great reduction in the loss of life, had the mines been thoroughly rock-dusted.

Of the remaining 50 men killed by explosions, 40 were killed in so-called shot-firer's explosions in mines where the coal is shot from the solid with black blasting powder, and all the explosions were due to overcharged and improperly placed shots. There is little or no excuse for fatalities from such a cause, as it could be eliminated if the coal were undercut and shot with permissible explosives, as is now being done in the majority of mines in Indiana.

Ten men were killed in minor gas explosions due to the ignition of gas by open lights. As in the case of the three major disasters, these deaths could doubtless have been prevented had there been better supervision and better ventilation, or had the mines been using closed lights and permissible machinery.

Of the fatalities attributable to mine fires, four were due to the ignition of gasoline by an open light in a small mine employing fewer than 10 men. The ignition occurred while the tank on a small oil engine was being filled.

All of the fatalities due to explosives were caused by the improper handling of black blasting powder, again pointing to the desirability of undercutting the coal and using the much safer permissible explosives.

During the 10-year period 1922-1931 there were 18 fatalities due to electricity; 11 were caused by contact with trolley wire and 7 by contact with other circuits. By taking greater care in guarding the trolley wire and the other circuits, accidents from this source could be largely eliminated. In many cases the use of storage-battery equipment would tend to eliminate accidents and would also add to efficiency.

Eight fatalities resulted from falling down shafts and were doubtless due mainly to lack of proper illumination at surface landings and to lack of safety gates at these landings. The United States Bureau of Mines in studying mine illumination has observed the beneficial results of good lighting, and strongly recommends adequate illumination as an aid to accident prevention. The use of up-to-date electric cap lamps would be a long step forward in increasing the efficiency of the miners' lighting in Indiana's coal mines.

Of the fatalities charged against cages, the majority were due either to being caught under the cage while working in the sump or to falling off the cage while it was being hoisted or lowered. These happenings show the necessity of taking every precaution against accidentally lowering the cage on men working beneath it, and also the desirability of having the cage equipped with a gate to be kept closed while men are being lowered or hoisted.

Another point of interest brought out by a study of the fatalities during the past 10 fiscal years is that 31, or 5.6 per cent, occurred in small mines employing less than 10 men. The State mining law does not apply to mines employing less than 10 men; hence, the Indiana Department of Mines has no jurisdiction over such mines and no inspection is made of them.

Original from THE OHIO STATE UNIVERSITY

While there is no way of determining the number of men employed in these small mines, it can not be large, and as they operate only during the winter months to supply coal to the domestic market, it is quite probable that the fatality rate in them is far greater than in the larger mines. In fairness to the men working in small mines it would appear that the mining law should be so amended as to be applicable to all mines, regardless of the number of men employed, so that the men working in the small mines might have the protection the mining law would afford, as well as the benefit of regular inspection by State inspectors.

The one fatality listed under suffocation in 1931 was that which occurred when a boy 11 years old climbed down the stairway of the escape shaft of an abandoned mine and was overcome by black damp; this is only one of numerous similar occurrences that have taken place in various parts of the country in recent years and clearly points to the necessity of guarding the surface openings to all old and abandoned mine workings.

Table 2 lists the fatalities for the 10-year period by occupation. In the column headed "Employees, approximate per cent" an attempt is made to compute as near as possible the percentage of each class of employment with respect to the total number employed in and around the mines. The data from which these figures were computed represent the actual employment at approximately 50 per cent of the mines of the State and are believed to be substantially correct. There is, however, a wide variance in the employment at mechanical and hand-loading machines, and doubtless a complete report from all the mines would change the figures somewhat; for instance, the percentage for drillers is believed to be somewhat high.

Using these figures on the percentage of employment for the various occupations, together with the number of fatalities for each occupation as a basis, the relative hazard for each occupation on the basis of 100 has been computed and is shown in the column headed "Relative hazard of occupation." As shot firers have the highest fatality rate for the number employed in this capacity, they were assigned the number 100.

The average age of those killed during this 10-year period was found to be 39. As most miners begin work in the mines before they are 18 years of age, it is reasonable to assume that these men had had an average of nearly 20 years of mining experience. The fatalities can not therefore, be charged to lack of experience, but rather to the lack of making proper use of the knowledge that should have been gained in their working years. It will be noted that the shot firers, constituting only 0.8 per cent of those employed, had 7 per cent of the fatalities in Indiana coal mines over the 10-year period 1922-1931, inclusive; this record indicates that shot firing practices are anything but safe. The various underground bosses constituted 2.1 per cent of the personnel, but supplied 4.3 per cent of the fatal accidents for the 10-year period, indicating either that "bossing" is a dangerous job or that the bosses are not as careful as they should be. Trip riders and drivers, constituting 5.4 per cent of those employed, had 11.8 per cent of the fatalities, indicating that much greater care should be taken in these occupations.

ACCIDENTS

The annual reports of the Industrial Board of Indiana give little information on mine accidents. However, through the courtesy of Judge Rosco Kiper, chairman of the board, the United States Bureau of Mines was given access to its files and as complete data as possible were obtained on compensable accidents (an accident causing more than 7 days disability is compensable), for the fiscal years ending September 30, 1930 and 1931. No figures were collected on noncompensable accidents, as the employer is not required to report the date of return to work in such cases and therefore no data could be obtained on the time lost for this type of accident. In addition, as the files are not segregated as to industry, it would have required at least 30 days time to collect the available data on these accidents, and it was not believed that the information would be of sufficient value to warrant the additional expenditure in collecting it.

Table 2.- Fatal accidents by occupation in Indiana coal mines for the fiscal years ending September 30, 1922-1931

Occupation	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	Total	Fatalities per cent of total	Employees approximate per cent	Relative hazard of occupation
Miner	20	33	27	50	17	41	18	14	14	18	252	45.4	50.1	10
Mining machinemen	1	2	4	8	5	4	2	3	2	11	42	7.5	5.1	17
Loading machinemen	-	-	1	-	-	-	-	-	1	11	13	2.3	4.3	6
Motormen	-	1	-	7	1	2	2	3	-	2	18	3.2	3.8	9
Trip rider	1	8	6	4	3	1	2	5	2	3	35	6.3	3.4	21
Driver	6	7	3	3	5	4	-	2	-	1	31	5.5	2.0	31
Tracklayer	2	-	-	5	1	1	-	1	-	6	16	2.9	3.1	11
Laborer	-	5	4	5	3	3	2	-	-	-	22	3.9	2.5	16
Trapper	1	-	1	-	1	2	-	-	-	-	5	.9	.5	21
Superintendent	-	-	-	-	1	-	-	2	-	-	3	.5	.5	11
Mine boss	-	-	-	1	1	-	2	2	1	1	8	1.5	.5	34
Room boss	-	-	2	-	3	-	-	-	-	3	8	1.5	.8	21
Motor boss or parting boss	1	-	1	-	-	-	-	-	-	-	2	.4	.2	23
Fire boss	-	1	-	-	-	1	2	-	-	1	5	.9	.6	17
Surveyor	-	1	-	-	-	-	-	-	-	-	1	.2	.2	11
Shot firer	7	8	2	13	2	4	-	1	1	1	39	7.0	.8	100
Timbermen	-	1	-	1	-	2	-	3	1	1	9	1.7	1.5	13
Shot runner	-	1	-	-	-	-	-	-	-	-	1	.2	.2	11
Cager	-	2	1	-	-	4	1	1	-	-	9	1.7	.8	24
Electrician	-	1	1	2	2	-	-	1	-	2	9	1.7	1.5	13
Pumper	-	-	-	-	1	1	-	1	-	-	3	.5	.5	11
Driller	-	-	-	1	-	1	-	3	1	1	7	1.2	1.7	8
Miscellaneous	-	-	-	-	-	-	-	-	-	1	1	.2	6.1	0.3
Top boss	-	1	1	-	-	-	-	-	-	1	3	.5	.4	14
Hoisting engineer	-	-	-	-	-	2	-	-	-	-	2	.4	.8	6
Top labor	-	4	1	1	2	1	1	-	-	1	11	2.0	8.1	3
Total	39	76	55	101	48	74	32	42	23	65	555	100.0	100.0	-

Tables 3, 4, 5, and 6 have been prepared from the data collected on compensable accidents. Table 3 gives the number of accidents, the days lost, and the compensation paid by occupation for the year ending September 30, 1930; also the percentage of total accidents, percentage of days lost, and percentage of compensation for each occupation. The column "Employment, per cent" shows the approximate percentage of employees in each occupation with respect to the total employed and, as previously explained, was prepared from employment figures obtained from approximately 50 per cent of the mines of the State.

The column "Relative accident hazard" shows the relative hazard to accidents for each occupation for the year, taking into consideration the percentage of total employment for each occupation and the percentage of total accidents received by each occupation. Drivers, having the highest frequency, are shown as 100, while the other occupations are shown in relation to 100.

The column "Relative severity hazard" shows the relative severity of accidents for the various occupations on the basis of 100 and was computed from the percentage of employment and percentage of total days lost for each occupation. In arriving at the days lost in this as well as in the other tables, the standard evaluation of 6,000 days for each fatality was used.

Table 4 is similar to Table 3 and gives the data for the fiscal year ending September 30, 1931. The great dissimilarity in the "Relative accidents hazard" and the "Relative severity hazard" for the years 1930 and 1931, may be explained, in part at least, as being due to the explosion which occurred in a mechanically operated mine during the year 1931.

Tables 5 and 6 give the number of accidents, the days lost, and the compensation paid, by cause, for the years 1930 and 1931, respectively; also the percentage of total accidents, the percentage of total days lost, and the percentage of total compensation paid for each type of accident are shown.

The dissimilarity in the percentages shown in Tables 5 and 6, as in Tables 3 and 4, are largely due to the explosion in 1931 in which 28 lives were lost.

Items 9 to 19, inclusive, of Tables 5 and 6 are chargeable to haulage and taken in the aggregate give a total of 186, or 29.5 per cent of all compensable accidents, 26.7 per cent of the total days lost, and 31.7 per cent of the compensation paid, for the year 1930; and 304, or 27.4 per cent of the total accidents, 12 per cent of the days lost, and 15.9 per cent of the compensation paid, in 1931. Items 9, 17, and 18 are chargeable to lack of clearance, and in 1930 account for 37 or 5.9 per cent of the total compensable accidents, 3.4 per cent of the time lost, and 5.9 per cent of the compensation paid; for 1931 these same three items were responsible for 62 or 5.6 per cent of the compensable accidents, 1.01 per cent of the total time lost, and 1.92 per cent of the compensation paid.

Items 14 and 16, caught between cars and caught between car and locomotive, are mainly chargeable to coupling or uncoupling cars while in motion. In 1930 these two items accounted for 52 or 8.3 per cent of total compensable accidents, 13.3 per cent of the days lost, and 13.3 per cent of the compensation paid; in 1931 they were responsible for 68 or 6.1 per cent of the total accidents, 2.8 per cent of the days lost, and 4.0 per cent of the compensation paid.

The annual reports of the industrial board for the fiscal years 1930 and 1931 show that a total of 2,303 lost-time accidents was reported in 1930 and of 2,248 in 1931, a decrease of 2.3 per cent. From the figures given in the annual reports of the Indiana Department of Mines and Mining it is found that the tonnage for 1931 was 16.8 per cent less and the days of exposure 16.7 per cent less than in 1930. On considering these latter facts it will be seen that accidents, or at least the accident rate, decidedly increased in 1931 over 1930.

The totals on Tables 5 and 6 show that there were 629 compensable accidents in 1930 and 1,113 in 1931, an increase of 76.9 per cent; also, there were 127,659 lost days as a result of compensable accidents in 1930, and 342,186 lost days in 1931, an increase of 168 per cent; at the same time there was a decrease of 16.8 per cent in tonnage and 16.7 per cent in days of exposure in 1931 as compared with 1930.

The total amounts paid in compensation represent only part of the total direct cost of accidents, as there must be added the cost of hospitalization of all accidents, both compensable and noncompensable. Actually, the direct cost of accidents to the operator is equal to the amount of indemnity insurance premium he is obliged to pay.

The average compensation insurance rate in Indiana is approximately $5.50 per $100 of pay roll, and as the annual reports of the Department of Mines and Mining give the total wages paid in 1930 as $13,400,204 and in 1931 as $10,713,103, it will be seen that the cost of compensation insurance, or in other words, the cost of accidents to the operator, was approximately $737,000 in 1930 and $589,200 in 1931.

Table 3.- Compensable accidents by occupation for the year October 1, 1929, to September 30, 1930

Occupation	Accidents		Days lost		Compensation paid		Employment,	Relative accident	Relative severity
	Number	Per cent	Number	Per cent	Amount	Per cent	per cent	hazard	hazard
Miners	281	44.6	58,428	45.8	$80,468.92	42.0	50.1	26	14
Machinemen and helpers	68	10.8	10,578	8.3	15,945.35	8.3	5.1	39	25
Motormen	25	4.0	6,377	5.0	16,935.93	8.9	3.8	31	21
Loading machinemen and helpers	28	4.4	8,482	6.7	12,877.82	6.8	4.3	30	25
Trip riders	35	5.5	13,681	10.7	16,099.82	8.4	3.4	49	50
Drivers	43	6.8	2,386	1.9	5,699.66	3.0	2.0	100	15
Tracklayers	18	2.9	1,298	1.0	3,805.35	2.0	3.1	42	5
Timbermen	24	3.8	7,474	5.9	9,205.81	4.8	1.5	74	63
Jerrymen or laborers	21	3.3	948	.7	2,077.90	1.1	2.5	39	4
Trappers	1	.2	14	.01	8.80	.0	.5	12	0.3
Cagers	6	.9	125	.1	185.21	.1	.8	33	2
Electricians	4	.6	124	.1	261.87	.2	1.5	12	1
Pumpers	3	.5	63	.05	99.00	.05	.5	29	1.6
Drillers	11	1.7	7,581	6.0	9,469.09	5.0	1.7	29	56
Batticemen	2	.3	201	.1	664.71	.35	.5	18	3
Shot runners	-	-	-	-	-	-	.2	-	-
Shot firer	2	.3	6,399	5.0	5,991.50	3.0	.8	11	100
Spraggers and couplers	12	1.9	1,365	1.1	3,353.15	1.8	.6	33	27
Superintendents	1	.2	63	.05	132.00	.1	.5	12	1.6
Mine boss	1	.2	39	.02	75.43	.04	.5	12	0.6
Motor or driver boss	-	-	-	-	-	-	.2	-	1
Fire boss	1	.2	77	.05	165.00	.1	.6	10	1
Room boss	1	.2	180	.1	429.00	.2	.8	7	2
Surveyor	-	-	-	-	-	-	.2	-	-
Other underground	3	.5	161	.1	2,589.75	1.4	5.0	3	0.3
Top boss	1	.2	13	.01	14.16	.01	.4	16	0.4
Weighman	-	-	-	-	-	-	.5	-	-
Blacksmith and helper	1	.2	16	.01	21.21	.01	.9	6	.1
Carpenters	1	.2	30	.02	1,335.00	.6	.4	16	.8
Hoisting engineers	1	.2	35	.02	66.00	.03	.8	7	.4
Firemen	1	.2	30	.02	16.50	.01	.6	10	.6
Flat trimmers	10	1.6	350	.24	667.19	.3	2.0	23	1.6
Other top labor	23	3.6	1,141	.9	2,596.53	1.4	3.7	29	4
Totals	629	100.0	127,659	100.0	191,257.66	100.0	100.0	-	-

Table 4.- Compensable accidents by occupation for the year October 1, 1930, to September 30, 1931

Occupation	Accidents		Days lost		Compensation paid		Employment, per cent	Relative accident hazard	Relative severity hazard
	Number	Per cent	Number	Per cent	Amount	Per cent			
Miners	490	44.0	44,638	13.0	$73,069.14	19.6	50.1	29	3
Machinemen and helpers	86	7.7	47,685	14.0	48,137.60	12.9	5.1	50	33
Motormen	39	3.5	14,664	4.2	18,627.02	5.0	3.8	30	15
Loading machinemen and helpers	106	9.5	105,514	30.8	92,936.43	24.9	4.3	73	100
Trip riders	67	6.0	21,327	6.2	22,835.78	6.1	3.4	58	22
Drivers	67	6.0	9,947	2.9	10,759.31	2.8	2.0	100	17
Tracklayers	39	3.5	27,674	8.1	29,510.44	7.9	3.1	37	32
Timbermen	24	2.1	1,057	.3	2,896.91	.7	1.5	47	2
Jerrymen and laborers	35	3.2	1,292	.38	4,011.55	1.7	2.5	47	2
Trappers	2	.2	147	.04	229.15	.06	.5	13	1
Cagers	12	1.0	581	.17	1,178.79	.3	.8	40	3
Electricians	13	1.0	20,306	6.0	20,453.58	5.4	1.5	22	49
Pumpers	9	.8	6,142	1.8	5,252.71	1.4	.5	53	44
Drillers	22	2.0	6,962	2.3	7,411.59	1.9	1.7	39	17
Bratticemen	4	.4	206	.06	419.57	.1	.5	27	1
Shot runners	1	.1	164	.04	742.50	.2	.2	17	2
Shot firers	4	.4	6,111	1.8	5,213.14	1.4	.8	17	27
Spraggers and couplers	7	.6	211	.06	568.08	.15	.6	33	1
Superintendents	2	.2	66	.02	122.57	.04	.5	13	0.5
Mine boss	4	.4	6,181	1.8	5,429.50	1.5	.5	27	44
Motor or driver boss	2	.2	258	.07	575.14	.15	.2	33	4
Fire boss	4	.4	6,135	1.8	5,318.80	1.4	.6	23	37
Room boss	5	.5	12,089	3.5	10,280.56	2.8	.8	17	54
Surveyor	1	.1	287	.08	660.00	.17	.2	17	5
Other underground	3	.3	139	.03	275.71	.07	5.0	2	0.1
Top boss	–	–	–	–	–	–	.4	–	–
Weighman	1	.1	168	.04	396.00	.11	.5	7	1
Blacksmith and helper	6	.5	188	.05	360.00	.09	.9	20	0.7
Carpenters	4	.4	117	.03	233.35	.06	.4	33	0.9
Hoisting engineers	1	.1	30	.01	288.75	.07	.8	3	0.1
Firemen	5	.5	89	.02	127.29	.03	.6	23	0.4
Flat trimmers	18	1.6	451	.1	752.40	.2	2.0	27	0.6
Other top labor	30	2.7	1,360	.3	3,175.81	.8	3.7	24	.1
Total	1,113	100.0	342,186	100.0	372,249.17	100.0	100.0	–	–

The annual reports show a total coal-mine production for the State of 10,887,499 tons in 1930 and 9,056,810 tons in 1931. Dividing these tonnages into the approximate premium costs for these same years gives an accident cost of 6.7 cents per ton in 1930 and 6.4 cents in 1931; this cost includes only the direct payment in compensation and the medical and hospital cost, but does not include any of the multitude of indirect costs such as loss of tonnage, loss of time of workers other than those injured, and other items of similar nature.

There is no definite information available on the number of all accidents, lost time and no lost time, compensable and noncompensable, but from information that could be obtained it is believed that lost-time accidents may be roughly estimated as one-third of all accidents, and compensable accidents as one-sixth of all accidents.

If we ignore the cost of no lost-time accidents it is found by dividing the approximate premium costs for 1930 and 1931 by the number of lost-time accidents given in the annual reports of the industrial board for these same years, that the cost per lost-time accident to the operator was $320 in 1930 and $262 in 1931.

These figures, as well as those on the cost of accidents per ton of coal produced, show that the cost of accidents to the operator was less in 1931 than in 1930. The actual cost of accidents, however, was much higher in 1931 than in 1930, the difference being absorbed by the insurance carriers. Unless the accident rate is decreased, the premium rate will of necessity have to be increased, as the insurance carriers can not continue the insurance at a loss for any long period.

Table 7 compares essential data on Indiana coal-mine accidents for the years 1930 and 1931. The comparison is not favorable for 1931. Although the explosion that occurred in 1931 is accountable in part for this unfavorable comparison, yet if the 28 fatalities due to the explosion are ignored, the comparison is still unfavorable.

Table 5.- Compensable accidents by causes for the year October 1, 1929, to September 30, 1930

Cause	Accidents		Days lost		Compensation paid	
	Number	Per cent	Number	Per cent	Amount	Per cent
Underground:						
1. Falls of rock	86	13.7	56,364	44.1	$61,353.30	32.1
2. Falls of coal	74	11.8	9,918	7.8	17,687.98	9.2
3. Lifting coal or rock	36	5.7	1,351	1.1	3,632.44	1.9
4. Dropping coal or rock	7	1.1	192	.2	404.14	.2
5. Flying coal in eyes	29	4.6	925	.7	2,244.11	1.2
6. Falling objects	19	3.0	974	.8	2,543.06	1.3
7. Animals	9	1.4	434	.3	727.60	.4
8. Stumbling	18	2.8	2,709	2.1	6,147.07	3.2
9. Caught between car and rib or timber	33	5.2	4,191	3.3	10,861.93	5.7
10. Caught between car and face	9	1.4	6,407	5.0	6,374.95	3.3
11. Run over by cars	21	3.3	2,276	1.8	7,947.39	4.2
12. Pushing cars	36	5.7	1,513	1.2	3,240.55	1.7
13. Lifting cars	14	2.2	1,190	.9	2,618.65	1.5
14. Caught between cars	39	6.2	9,579	7.5	13,792.90	7.2
15. Miscellaneous cars	15	2.4	716	.6	1,555.29	.8
16. Caught between car and locomotive	13	2.1	7,366	5.8	11,565.49	6.1
17. Caught between locomotive and roof	4	.7	177	.1	390.79	.2
18. Caught between locomotive and rib or timber	-	-	-	-	-	-
19. Run over by locomotive	2	.3	651	.5	1,977.00	1.0
20. Gas and dust explosion	3	.5	6,236	4.9	5,497.46	2.9
21. Electricity (trolley)	3	.5	68	.05	122.57	.07
22. Electricity (other circuit)	5	.8	1,140	.9	1,025.14	.5
23. Mining machines	27	4.3	1,829	1.4	6,450.25	3.4
24. Mining machine jack pipe	13	2.1	289	.2	1,376.88	.7
25. Loading machine and conveyors	7	1.1	6,195	4.9	6,060.27	3.2
26. Other machinery	6	.9	192	.2	361.50	.02
27. Explosives	4	.7	888	.6	4,198.57	2.2
28. Tools	26	4.1	844	.6	1,605.86	.9
29. Miscellaneous	32	5.1	849	.6	1,489.13	.8
Shaft:						
30. Falling down	1	.2	112	.09	2,447.00	1.3
31. Material falling	-	-	-	-	-	-
32. Miscellaneous	-	-	-	-	-	
33. Cage	2	.3	65	.05	1,371.00	.7
Surface:						
34. Railroad cars and locomotives	4	.7	264	.25	658.31	.3
35. Bursting boiler or steam pipe	1	.2	21	.01	33.00	.01
36. Machinery	8	1.3	142	.15	226.63	.1
37. Electricity	-	-	-	-	-	-
38. Falling objects	12	1.8	888	.7	1,870.74	1.0
39. Miscellaneous	12	1.8	704	.6	1,398.71	.7
Total	629	100.0	127,659	100.0	191,257.66	100.0

Table 6.- Compensable accidents by causes for year October 1, 1930, to September 30, 1931

Cause	Accidents		Days lost		Compensation paid	
	Number	Per cent	Number	Per cent	Amount	Per cent
Underground:						
1. Falls of rock	117	10.5	47,478	13.9	$59,555.44	15.9
2. Falls of coal	110	10.0	22,742	6.6	24,855.50	6.7
3. Lifting coal or rock	66	6.0	4,480	1.3	10,694.61	2.9
4. Dropping coal or rock	51	4.6	2,019	.6	4,910.62	1.3
5. Flying coal in eyes	40	3.6	2,436	.7	6,110.48	1.6
6. Falling objects	37	3.3	1,297	.3	3,904.37	1.1
7. Animals	24	2.2	7,180	2.1	5,513.75	1.5
8. Stumbling	46	4.1	2,932	.9	7,490.45	2.0
9. Caught between car and rib or timber	45	4.0	2,451	.7	5,932.12	1.6
10. Caught between car and face	4	.4	148	.04	283.93	.08
11. Run over by cars	32	2.9	8,384	2.5	10,226.94	2.7
12. Pushing cars	53	4.8	1,958	.6	3,910.63	1.1
13. Lifting cars	40	3.6	13,247	3.8	11,825.17	3.2
14. Caught between cars	52	4.7	2,359	.7	5,810.15	1.5
15. Miscellaneous cars	39	3.5	3,803	1.1	8,915.77	2.4
16. Caught between car and locomotive	16	1.4	7,191	2.1	9,173.03	2.5
17. Caught between locomotive and roof	4	.4	61	.01	77.79	.02
18. Caught between locomotive and rib or timber	13	1.2	708	.3	1,395.10	.3
19. Run over by locomotive	6	.5	577	.2	1,749.15	.5
20. Gas and dust explosion	42	3.7	174,445	51.0	149,382.56	40.1
21. Electricity (trolley)	2	.2	6,035	1.8	5,121.00	1.3
22. Electricity (other circuits)	16	1.4	6,284	1.8	5,491.28	1.5
23. Mining machines	43	3.8	4,290	1.2	1,453.63	.4
24. Mining machine jack pipe	9	.8	257	.07	441.09	.1
25. Loading machine and conveyors	44	3.9	7,589	2.2	11,291.86	3.0
26. Other machinery	12	1.1	719	.2	1,506.21	.4
27. Explosives	-	-	-	-	-	-
28. Tools	37	3.3	1,019	.3	1,928.31	.5
29. Miscellaneous underground	38	3.4	1,288	.4	2,797.32	.8
Shaft:						
30. Falling down	2	.2	6,000	1.75	5,050.00	1.4
31. Material falling	1	.1	144	.04	322.93	.09
32. Miscellaneous	3	.3	164	.04	337.00	.09
33. Cage	4	.4	176	.05	400.62	.11
Surface:						
34. Railroad cars and locomotives	13	1.2	391	.1	722.70	.2
35. Bursting boiler or steam pipe	-	-	-	-	-	-
36. Machinery	8	.7	340	.09	1,219.80	.3
37. Electricity	1	.1	28	.01	39.60	.01
38. Falling objects	14	1.2	538	.2	965.63	.2
39. Miscellaneous	29	2.5	1,128	.3	2,342.63	.6
Total	1,113	100.0	342,186	100.0	372,249.17	100.0

Table 7.- Essential data on coal-mine accidents in Indiana during the fiscal years 1930 and 1931

Item	1930	1931	Increase or decrease	
			Number	Per cent
Average employees	10,698	9,948	-750	7
Coal mined, tons	10,887,499	9,056,810	-1,830,689	16.8
Man-days worked	1,728,974	1,440,005	-288,969	16.7
Man-hours worked	13,831,792	11,520,040	-2,311,752	16.7
Fatalities	23	65	+42	182.6
Lost-time accidents	2,303	2,248	-55	2.3
Compensable accidents	629	1,113	+484	76.9
Fatal accidents per million man-hours of exposure (United States average 1.8)	1.66	5.64	+3.98	239.7
Lost-time accidents per million man-hours of exposure	166.5	195.1	+28.6	17.1
Compensable accidents per million man-hours of exposure	46.8	96.6	+49.8	106.4
Days lost from compensable accidents	127,659	342,186	+214,527	168
Compensation paid	$191,258	$372,249	+$180,992	94.5
Per cent of total employees receiving lost-time injuries	21.5	22.5	-	-
Per cent of total employees receiving compensable injuries	5.8	11.1	-	-
Days lost per compensable accident	54	152	+98	181
Coal mined per fatality, tons	473,369	139,335	334,034	70
Fatalities per million tons (United States average 1911-1928, 3.77)	2.11	7.16	+5.05	239
Fatalities per 1000 men employed (United States average 1911-1928, 3.08)	2.14	6.53	+4.39	205
Coal mined per lost-time accident, tons	4,607	4,029	-578	12.5
Coal mined per compensable accident, tons	17,309	8,139	-9,170	53
Average sum paid per compensable accident	$304	$334	+$30	9
Premium cost per lost-time accident	$320	$262	-	-
Average time lost per compensable accident, days	203	307	+104	51
Cost of compensation insurance, cents per ton	6.7	6.4	-	-
Frequency rate (59.12 is average of 92 bituminous mines in National Safety Competition of 1931)	170	195	-	-
Severity rate (compensable accidents only)	9.2	30.2	-	-